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# Observations on the kelp fly, *Coelopa vanduzeei* Cresson in Southern California

(Coelopidae: Diptera)

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The kelp fly, *Coelopa vanduzeei* Cresson, occurs along the Pacific coast from Baja California to Kodiak, Alaska (Cole, 1967). This fly becomes numerous on beaches in southern California in late summer and causes general annoyance to bathers and others frequenting the seashore. Adult flies swarm over stranded kelp on the beach and literally darken the sand with their numbers. Observations made on a beach in southern California during the summer and winter months show this fly to have a behavioral pattern different from that reported in other parts of California (Kompfner, 1974).

## Materials and Methods

Field observations were made during the months of August, December and January (1974 and 1975) on a San Diego County beach located in the town of Solana Beach, California. The beach is composed almost entirely of sand which abuts against steep sandstone cliffs. Large kelp beds which occur just offshore supply a continual source of wrack on the beach. The kelp forming the majority of the wrack beds are the giant kelp, *Macrocystis pyrifera;* the elk kelp, *Pelagophycus porra;* and the feather-boa kelp, *Egregia* sp.

Mature larvae and puparia of *C. vanduzeei* were observed directly on the beach and collected for laboratory studies by washing infested beach sand through window screen. Adults were collected with a net and maintained in cages with washed beach sand.

## Results

All stages of *C. vanduzeei* were found in or under the kelp during the study period. The adults probably occur on the beach throughout

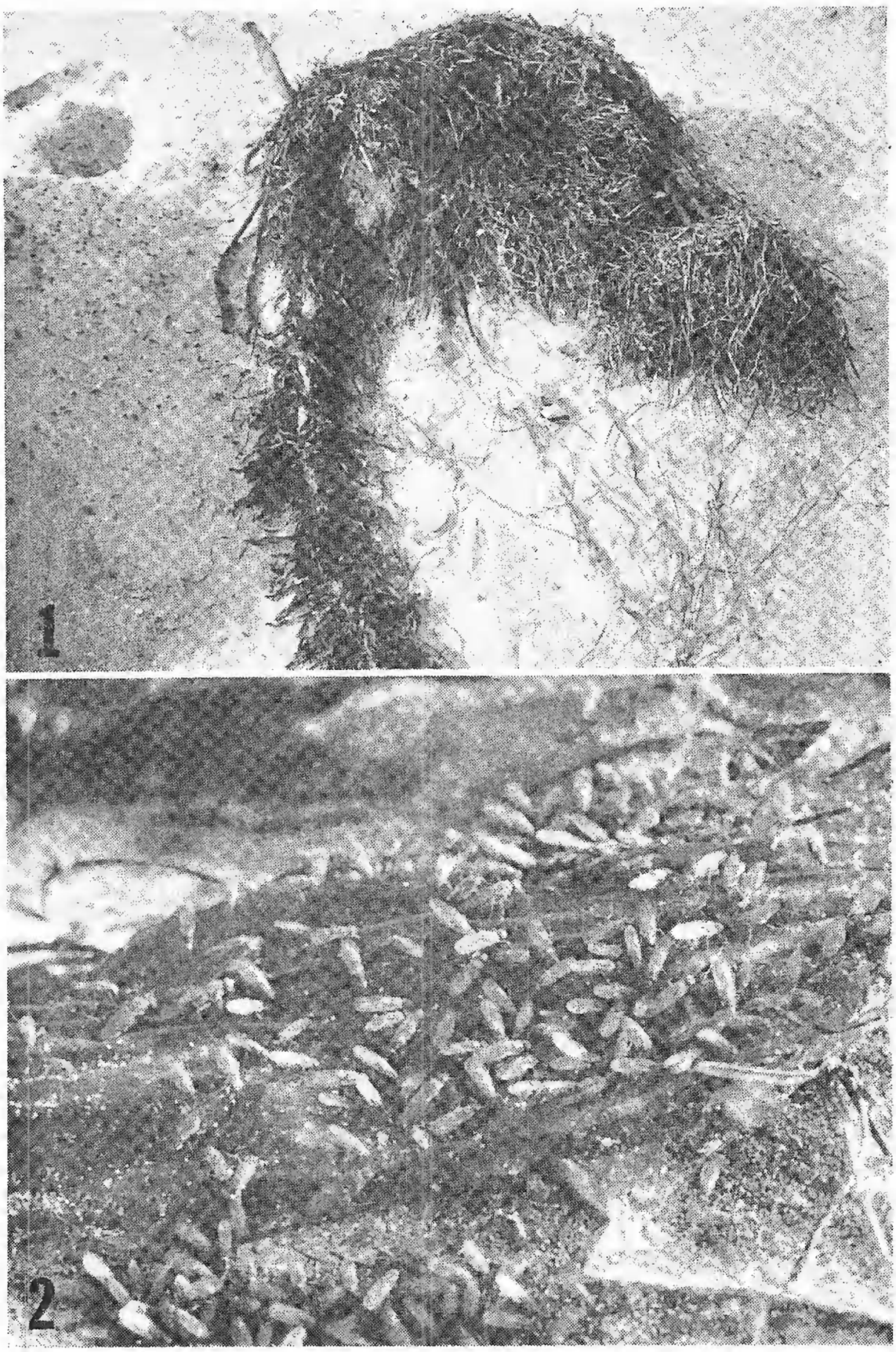


Fig. 1. Small clump of kelp harboring developing larvae of *C. vanduzeei.* Note adults of *C. vanduzeei* on the sand adjacent to the seaweed.

Fig. 2. Adults of *C. vanduzeei* clustering on seaweed.

the year, although their populations in winter are much lower than in late summer. Whereas larvae and puparia are common in December, many adult flies appear to be in a state of diapause. During the day, they can be found clustering under seaweed at the high tide level, and during the night many occur in crevices or protected areas on the sandstone cliffs. During the month of August, the flies emerge over a 1-2 week period and literally cover the beach, not only clustering on washed-up seaweed, but alighting indiscriminately on sand and bathers (Figs. 1 & 2). They were especially attracted to bird droppings and marine invertebrates that were washed ashore.

The white, elliptical eggs were deposited singly or in small groups in the kelp piles (Fig. 3). The females generally sought out the moist seaweed at the bottom of the wrack piles. Eggs were usually only deposited on seaweed at the high tide level and rarely on kelp stranded in the middle or lower tide zone. This may be because the eggs are only lightly attached to the seaweed and are easily washed off. However, they hatch very quickly, often within 24 hours at temperatures reached at the study site (90°F). The newly hatched larvae may tunnel through the fleshy parts of the seaweed or simply grove the outside portion of the plant, as is typical of the older larval instars.

In August, the larvae prefer to feed on kelp covered with 1-2 inches of sand, probably because the exposed portions quickly desiccate in the hot, dry climate. This also serves to protect them from being washed out to sea. During December and January, the larvae can be found feeding within the exposed kelp mass. The mature third instar larvae collect together in clusters just under the surface of the sand near the kelp piles. When the latter are turned over and the first few inches of sand removed, the sand literally moves with maggots. Their presence is indicated by the activities of shore birds such as the western willet, *Catopthrophorus semipalmatus* and marbled godwit, *Limosa fedoa,* which will come to the high tide level or even above to feed on larvae of *C. vanduzeei.* Other enemies of larval kelp flies were mainly staphylinid beetles, especially *Cafius seminitens.* This predator was extremely abundant and could be collected in large numbers by digging a cylindrical hole (30 cm deep) in the sand near the fly larvae. Amphipods were also found associated with larvae of *C. vanduzeei.*

The larvae pupate in the upper few centimeters of sand and the adult flies emerge in 5-6 days. Most mature larvae collected in August ranged from 8-10 mm in length. The puparium is usually dark brown and about 5 mm long. The waves wash them out of the sand where they collect conspicuously on the beach (Fig. 4). The adult flies range from 3.5 – 5.0 mm in length, and in the fall began mating soon after emergence. At least a portion of the adult winter population appears to be in diapause. The adults were restricted to the immediate beach area and were never recovered from refuse near adjacent homes.

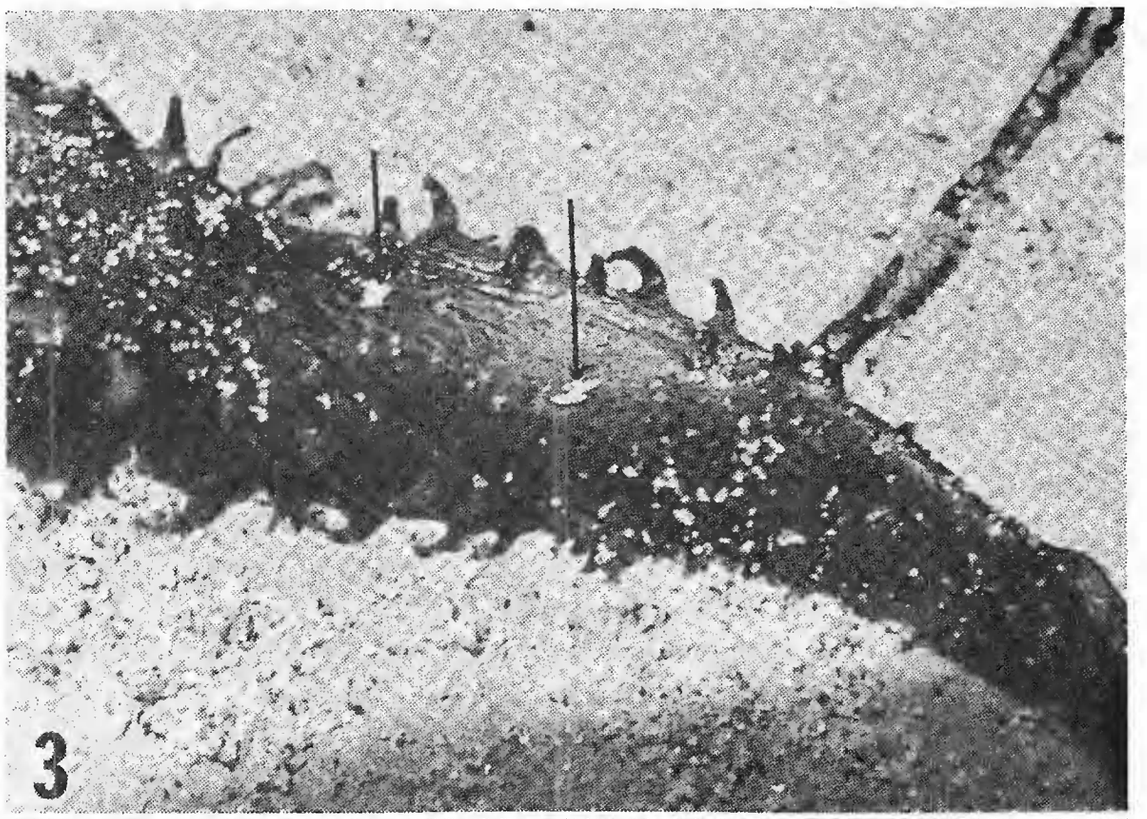



Fig. 3. Eggs (arrow) of *C. vanduzeei* attached to seaweed.

Fig. 4. Mature third-stage larvae and puparia of *C. vanduzeei.*

## Discussion

It is interesting that Egglishaw (1960) reported largest numbers of *Coelopa frigida* and *C. pilipes* in England during the autumn and winter months. This was associated with the comparatively larger masses of wrack washed up on shore in the fall. The situation is reversed in southern California. Aside from the increased temperature, there are two other factors which probably play a role in the summer's production of large numbers of flies. Large kelp beds just off shore are commercially harvested throughout the summer. This results in masses of kelp fragments which are washed on the beach and provide food for the flies. Also, from time to time during the summer months, the wrack is pushed aside by bulldozers to maintain a clean swimming area. In so doing, large piles of seaweed which become half buried in the sand above or at the high tide level provide an ideal breeding habitat for *C. vanduzeei* and other flies. The adults then become a general nuisance to people, alighting on their bodies and are sometimes seen around the eyes of children. It is known that adult kelp flies from several coast sites in Australia carry a virus. Scotti et al (1976) comment that this virus appears most common in winter when the adult flies are gregarious. The host range of this virus has not completely been determined.

The importance of *C. vanduzeei* and other kelp flies in ridding the beaches of seaweed should also be mentioned. Egglishaw (1960) mentioned that stalks of the seaweed, *Laminaria* that were not attacked by larvae of *C. frigida,* withered and dried up, but stalks with feeding larvae quickly decomposed, indicating that larval activity greatly helped decomposition of the wrack. Thompson in Egglishaw (1960) found that larvae of *C. frigida* did not survive well if only a few were present, and suggested that numerous larvae may be necessary to provide an attractive feeding environment. This may explain, in part, why Coelopid flies are usually seen in large numbers.

Kompfner (1974) reported that in Monterey Bay, California, *C. vanduzeei* occupied the lower beach wrack banks. The present studies showed that during August, most activity occurred in the kelp piles at the upper beach banks. This variation could result from the different physical environment of the two beaches, however it would be interesting to know if behaviorial races of this kelp fly species occur.

## Acknowledgments

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## ZOOLOGICAL NOMENCLATURE ANNOUNCEMENT A.N. (S) 101

The required six months' notice is given of the possible use of plenary powers by the International Commission on Zoological Nomenclature in connection with the following names listed by case number: (see Bul. Zool. Nom. 33,parts 3 & 4, 31 March 1977).

Z.N.(S.) 2157 *Goniurellia* Hendel, 1927 (Insecta, Diptera, TEPHRITIDAE): designation of type-species.

Z.N.(S.) 2168 *Siphonophora* Fischer, 1823 (Bryozoa), status of: *Siphonophora* Brandt, 1837 (Diplopoda, Polyzoniida), validation of.

Z.N.(S.) 2170 *Pieris castoria* Reakirt, 1867 (Insecta, LEPIDOPTERA): proposed suppression.

Z.N.(S.) 2173 *Culex loewi* Giebel, 1862 (Insecta, Diptera, CULICIDAE): request for suppression so as to conserve *Toxorhynchites brevipalpis* Theobald, 1901.

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